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THE PART OF FLOOD IN THE FORMATION OF THE AVIFAUNA IN THE FLOOD AREA OF THE TISZA

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Abstract

The author is dealing with the effect of floods upon the bird-stand in the flood area on the basis of his two-decade experiences obtained in the Mártély-Sasér Nature Conservation Area in the flood area of the river Tisza, about 30 km north of Szeged.

He is showing the biotope-types, formed, resp. transformed owing to the three annual floods of the Tisza repeating themselves regularly (water-surface of the „living" Tisza and backwaters, the pool-system formed in the flood area, the deep-, resp. shallow-water lake filling in the whole flood area, and the woods of the flood area), and the bird-types characteristic of these biotopes.

He sees the cause of the various bird species appearing in the flood area, as well as replacing one another in space and time, in the different ecological demands of bird organism. The species appear in the place of the flood area, in the suitable period and in the highest number proportionate to the sustaining capacity of the area: where, when, and in which degree they can satisfy their ecological demands.

On the basis of my experiences obtained during investigating one of the largest and most beautiful flood-area regions of the Tisza, the so-called Mártély-Sasér Nature Conservation Area for approximately two decades, I should like to refer to the decisive part of floods of this river in forming the avifauna of the flood area.

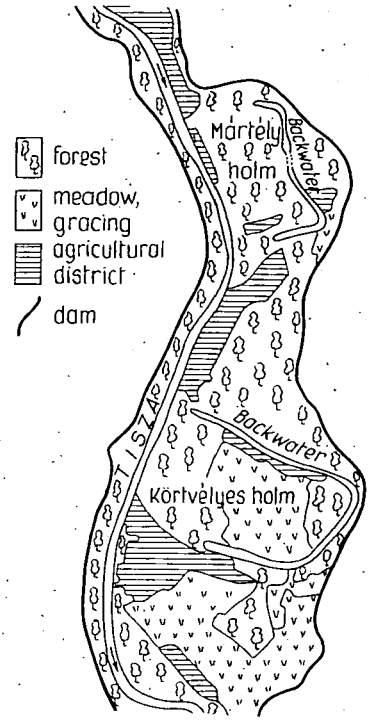
In this nature conservation area the natural conditions existing before the regularization of riverways can still be found sporadically.

The three Tisza-backwaters: the dead channels at Mártély, Körtvélyes, and Atka, are lending variety to the area. Along the „living" Tisza and the backwaters, and the anti-inundation dams, the area is covered with willow-poplar gallery forests, elsewhere with extensive meadows, pastures, to a lesser extent with agricultural cultures. In patches, there are growing large aspen plantations, as well. Its area is 2760 ha, about 11 km long by 2 to 4 km wide (Sketch map No. 1).

On the basis of the hydrographical conditions taking place here, mainly on the so-called Körtvélyes-island, as a result of the Great inundation of 1970, then of the long drawn-out triple flood-waves, almost connected with one another in 1974, we can form an idea of the primeval conditions having prevailed on the Great Hungarian Plain in the days of old.

We have, of course, no written records of that period. But the hydrographical conditions of the period before the Hungarian conquest of Hungary, i. e., about 1000 years ago, may be concluded well from a note of Tacitus, the great Roman historian. He was writing that, on the then territory of the Hungarian Plain, there were so many marshes, lakes, backwaters that even the Romans living in Pannonia (the present-

day part of Hungary that lies between the Danube, the Drava and the western frontier of the country) didn't quite exactly know if they should name that region land or water.



Sketch map No. 1. Mártély-Sasér Nature Conservation Area.

Before the Tisza control, the several waters of small depth gave fish and amphibians excellent places for spawning and feeding. These were, consequently, extremely multiplied, providing plenty of food for water-fowls. In that way came about the bird-life of legendary richness about which the first scientific data are published by MARSIGLI in vol. 5 ("Aves aquaticae circa Danubium et Tibiscum viventes") of his book "Danubius Pannonico-mysicus" in 1726.

Hertelendy was discussing the rich avifauna of the marsh Fehérmocsár in the Lower Tisza Region in 1866.

JENŐ NAGY was reporting on several hatching *Anser ansers*, as well, in the marsh Fehértó in the same region, in 1914.

In connection with the water motion of the Tisza, from ornithological point of view, two fundamental problems arise: If the flood-waves exert an effect on the avifauna of the flood area? And if they do, will these be of positive or negative effect on the formation of the bird population?

To the first question, by reason of our observations and also on the basis of literary data, we have to reply that *flood-waves are inducing considerable biotope-transformations* and these are exerting a decisive effect upon the formation of the bird population.

On the basis of our regular observations we have established that the number of floods drifting down in the river, the water-mass of the single flood-waves and the length of time of their drift play a main part in the change of progressive or regressive direction in the avifauna of the flood area.

The qualitative and even quantitative change in the population depends upon the biotopes formed as a result of water motion.

1. The most permanent biotope is *the water suface of the "living" Tisza and backwaters.* In Winter, hundreds of *Anas platyrhynchos* and lesser *Bucephala clangula* flocks are staying here, in ice-free places.

On the water surface of the river, overswollen by the late-winter flood as a result of the melting snow, on the occasion of the bird migration in Spring, the flocks of golden-eyes disappeare but the number of mallards is multiplied, completed by *Anas crecca* flooks.

In Autumn, in the time of the so-called autumn flood, the same latter species are similarly predominating although their number is smaller than that observed in the time of the spring bird movement.

2. The *biotopes of ihe flood* area change according to the water motion of the Tisza and the seasons.

a) In the years of an average water motion, in early Spring, a *periodical pool-system* forms from the accumulated winter precipitation in the flood areas of lower lying. In these places, in the time of the spring migration, thousands of geese *(Anser albifrons, Anser fabalis, Anser anser)* and ducks *(Anas platyrhynchos, Anas crecca, Anas querquedula, Aythia ferina, Anas acuta, Spatula clypeata,* and *Anas penelope)* are staying. At its riversides, the riparian birds *(Vanellus vanellus, Limosa limosa, Tringa totanus, Tringa nebularia, Tringa ochropus, Tringa glareola, Actitis hypoleucos, Philomachus pugnax, Calidris alpina)* relieve one another in flocks of hundreds, some species of thousands, in the resting places for a few days of their way towards north. In that period, several Grallatores *(Nycticorax nycticorax, Ardea cinerea* and *Ardeapurpurea, Ardeola ralloides, Egretta garzetta)* are fishing, as well. Above the pools, several individuals of *Larus ridibundus* and few ones of *Sterna hirundo* are flying. These periodical waters are, therefore, excellent transit camps for the birds migrating along the Tisza.

b) In years with plenty of precipitation when the spring-flood fills up the flood area from dam till dam, the region at Mártély-Körtvélyes is transformed into a 9 to 10 km long by 3 to 4 km wide *open-water lake.* The picture of avifauna is changed: the riparian birds mostly disappear, the natatorial birds and mergansers persist in staying. Their number is, however, not multiplying as the water-surface grows, and even it is decreasing, and that is easy to understand as the nutritive conditions deteriorate together with growing of the water-depth and water-stream. The flood has, therefore, in this case a negative effect upon the formation of the avifauna.

c) A development of contrary direction is shown by the particular water biotope *in the years following the great floods or if the spring-flood is persisting for a long time* and drawing back slowly (as it happened in 1974, too). In this case, there is plenty of water in the pool-system of the flood area already mentioned before, all the Summer round. The biotopes of river character, so far, are transformed into *waters similar to the shallow lakes* in the Hungarian Plain. The bird species characteristic of the flood area of the river persist but completed by characteristic lake species (e. g., *Numenius arquata*). Some species that at another water-level only pass through are now building nests *(Podiceps cristatus, Tringa totanus)*. Some rare spe-

cies may appear: the migratory *Egretta alba,* one individual or two of *Plegadis falcinellus,* some considerable flocks of *Platalea leucorodia.*

The biotopes are, therefore, transformed by the flood in positive relation, the consequence of what appears in the increase of the number of species and not only of that of individuals. The mass of many thousand birds of the rich avifauna formed, the heterogeneous composition of its species recall in memory the ancient avifauna mentioned in the introduction.

d) The development of the avifauna living in the biotope of the *woods in the flood area* is influenced by the flood by and large in two relations.

It exerts a negative effect on the species populations leading a terricolous life on the substratum of the gallery forests. By destroying the nests, resp. by stopping the possibility of nesting, it prevents the species from multiplying. And as the soil and low vegetation providing a possibility for nutrition are getting under water, even the survival of the species in the given area becomes impossible. (The species *Luscinia megarhinchos, Troglodytes troglodytes, Phylloscopidae, Turdus merula* are leaving the area).

From the point of view of the arbolicolous species, the flood-wave of normal course is not so much considerable. The crown-level of trees gets namely on with playing the part of a "terrestris" biotope because the water persisting intermittently at the level of the stems of trees is exerting hardly any influence on the feeding and nesting possibilities at crown level *(Turdus philomelos, Hippolais icterina, Muscicapa striata, Fringilla coelebs, Oriolus oriolus).*

Looking, together with Laage, for the cause of the above-presented considerable change in the avifauna of the flood area, we may establish the following: Birds are chained to some ecological factors (feeding possibility, hiding- and hatching-place, etc.). The single species appear in the highest possible individual number where they find these factors and according to the degree of these. (I think here, of course, only on the biotopes of areas free from human intervention).

The biotopes transformed as a result of flood-waves may, therefore, induce the appearance of new bird species or, just on the contrary, the disappearance of those.

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